

Subpart H—Interim Measures for Certain Tank Vessels Without Double Hulls Carrying Animal Fat or Vegetable Oil

SOURCE: CGD 91-045, 61 FR 39791, July 30, 1996, unless otherwise noted.

§ 157.500 Purpose and applicability.

(a) The purpose of this subpart is to establish mandatory safety and operational requirements to reduce environmental damage resulting from the discharge of animal fat or vegetable oil.

(b) This subpart applies to each tank vessel specified in §157.01 of this part that—

- (1) Is 5,000 gross tons or more;
- (2) Carries animal fat or vegetable oil in bulk as cargo or cargo residue; and
- (3) Is not equipped with a double hull meeting §157.10d of this part, or an equivalent to the requirements of §157.10d, but required to be equipped with a double hull at a date set forth in 46 U.S.C. 3703a (b)(3) and (c)(3).

§ 157.510 Operational measures.

An owner or operator of a tank vessel that carries animal fat or vegetable oil in bulk as cargo or cargo residue shall comply with the requirements in all sections of subpart G of this part.

Subpart I—Interim Measures for Certain Tank Vessels Without Double Hulls Carrying Other Non-Petroleum Oil

SOURCE: CGD 91-045, 61 FR 39791, July 30, 1996, unless otherwise noted.

§ 157.600 Purpose and applicability.

(a) The purpose of this subpart is to establish mandatory safety and operational requirements to reduce environmental damage resulting from the discharge of other non-petroleum oil.

(b) This subpart applies to each tank vessel specified in §157.01 of this part that—

- (1) Is 5,000 gross tons or more;
- (2) Carries other non-petroleum oil in bulk as cargo or cargo residue; and
- (3) Is not equipped with a double hull meeting §157.10d of this part, or an equivalent to the requirements of §157.10d, but required to be equipped with a double hull at a date set forth in 46 U.S.C. 3703a (b)(3) and (c)(3).

§ 157.610 Operational measures.

An owner or operator of a tank vessel that carries other non-petroleum oil in bulk as cargo or cargo residue shall comply with the requirements in all sections of subpart G of this part.

APPENDIX A TO PART 157—DAMAGE ASSUMPTIONS, HYPOTHETICAL OUTFLOWS, AND CARGO TANK SIZE AND ARRANGEMENTS

1. *Source.* The procedures for the damage assumption calculations contained in this Appendix conform to Regulations 22, 23, and 24 of Annex I of the International Convention for the Prevention of the Pollution from Ships, 1973, done at London, November 2, 1973.

2. *Assumptions.* For the purpose of calculating hypothetical outflow from tank vessels, three dimensions of the extent of damage of a parallelepiped on the side and bottom of the vessel are assumed.

(a) For side damage, the conditions are as follows:

Damage	Conditions
(1) Longitudinal extent (l_c)	$\frac{1}{3} L^{2/3}$ or 14.5 m, whichever is less.
(2) Transverse extent (t_c) (inboard from the vessel's side at right angles to the centerline at the level corresponding to the assigned summer freeboard).	B —or 11.5 m, whichever is 5 less.
(3) Vertical extent (v_c)	From the base line upwards without limit.

(b) For bottom damage, two conditions to be applied individually to the stated portions of the vessel, as follows:

Damage	Conditions	
	For 0.3L from the forward perpendicular of ship	Any other part of ship
(1) Longitudinal extent (l_s)	$L/10$	$L/10$ or 5 meters, whichever is less.
(2) Transverse extent (t_s)	$B/6$ or 10 meters, whichever is less but not less than 5 meters.	5 meters.
(3) Vertical extent from the base line (v_s)	$B/15$ or 6 meters, whichever is less	$B/15$ or 6 meters, whichever is less.

3. *Hypothetical Outflow of Oil.* (a) The hypothetical outflow of oil in the case of side damage (O_c) and bottom damage (O_s) is calculated by the following formula with respect to compartments breached by damage to all conceivable locations along the length of the vessel to the extent as defined in section 2 of this Appendix.

(1) For side damages: Formula

$$O_c = \Sigma W_i + \Sigma K_i C_i$$

(2) For bottom damage: Formula II

$$O_s = \frac{1}{3}(\Sigma Z_i W_i + \Sigma Z_i C_i)$$

Where:

W_i =Volume of a wing tank assumed to be breached by the damage as specified in section 2 of this Appendix; W_i for a segregated ballast tank may be taken equal to zero;

C_i =Volume of a center tank assumed to be breached by the damage as specified in section 2 of this Appendix; C_i for a segregated ballast tank may be taken equal to zero;

$$K_i = 1 - \frac{b_i}{t_c}$$

when b_i is equal to or greater than t_c , K_i is equal to zero;

$$Z_i = 1 - \frac{h_i}{v_s}$$

when h_i is equal to or greater than v_s , Z_i is equal to zero;

b_i =Minimum width of wing tank under consideration measured inboard from the vessel's side at right angles to the centerline at the level corresponding to the assigned summer freeboard; and

h_i =Minimum depth of the double bottom under consideration; where no double bottom is fitted, h_i is equal to zero.

(b) If a void space or segregated ballast tank of a length less than l_c is located between wing oil tanks, O_c in formula I of this section may be calculated on the basis of volume W_i being the actual volume of one such tank (where they are of equal capacity) or the smaller of the two tanks (if they differ in capacity), adjacent to such space, multiplied by S_i as defined below and taking for all other wing tanks involved in such a collision the value of the actual full volume.

$$S_i = 1 - \frac{l_i}{l_c}$$

Where l_i =length of void space or segregated ballast tank under consideration.

(c) Credit is only given in respect to double bottom tanks which are either empty or carrying clean water when cargo is carried in the tanks above.

(1) If the double bottom does not extend for the full length and width of the tank involved, the double bottom is considered non-

existent and the volume of the tanks above the area of the bottom damage must be included in formula II of this section even if the tank is not considered breached because of the installation of such a partial double bottom.

(2) Suction wells may be neglected in the determination of the value h_i if such wells are not excessive in area and extend below the tank for a minimum distance and in no case more than half the height of the double bottom. If the depth of such a well exceeds half the height of the double bottom, h_i is taken equal to the double bottom height minus the well height.

(d) In the case where bottom damage simultaneously involves four center tanks, the value of O_s may be calculated according to formula III as follows:

$$O_s = \frac{1}{4}(\Sigma Z_i W_i + \Sigma Z_i C_i)$$

(e) Credit for reduced oil outflow from bottom damage may be applied to formula III for an installed emergency high suction cargo transfer system that:

(1) transfers within two hours oil equal to one half of the volume of the largest tank involved;

(2) has sufficient ballast or cargo tankage available to receive the transferred oil; and

(3) has the high suction piping installed at a height not less than the vertical extent of bottom damage (v_s).

4. *Allowable volumes of cargo tanks.*

(a) The allowable volume of a wing cargo tank (VOL_w) is equal to seventy-five percent of O_A . In a segregated ballast tank vessel VOL_w may equal O_A for a wing cargo oil tank located between two segregated ballast tanks each of length greater than l_c and width greater than t_c .

(b) The allowable volume of a center cargo tank (VOL_c) is 50,000 cubic meters.

5. *Allowable length of cargo tanks.*

The length of each cargo tank (l) must not exceed 10 meters or the distance calculated from (a), (b), or (c), as appropriate, whichever is greater:

(a) Where no longitudinal bulkhead is provided inside the cargo tanks: $l = [0.5(b_i/B) + 0.1] L$, but not to exceed 0.2L.

(b) Where a centerline longitudinal bulkhead is provided inside the cargo tanks: $l = [0.25(b_i/B) + 0.15] L$, but not to exceed 0.2L.

(c) Where two or more longitudinal bulkheads are provided inside the cargo tanks:

(1) For wing cargo tanks: $l = 0.2L$.

(2) For center cargo tanks:

(i) If (b_i/B) is equal to or greater than 0.2, $l = 0.2L$.

(ii) If (b_i/B) is less than 0.2:

(A) Where no centerline longitudinal bulkhead is provided, $l = [0.5(b_i/B) + 0.1] L$.

(B) Where a centerline longitudinal bulkhead is provided, $l = [0.25(b_i/B) + 0.15] L$.

(d) “bi” is the minimum distance from the ship’s side to the outer longitudinal bulkhead of the tank in question, measured inboard at right angles to the centerline at the level corresponding to the assigned summer freeboard.

[CGD 74-32, 40 FR 48283, Oct. 14, 1975, as amended by CGD 74-32, 40 FR 49328, Oct. 22, 1975; CGD 90-051, 57 FR 36245, Aug. 12, 1992]

APPENDIX B TO PART 157—SUBDIVISION AND STABILITY ASSUMPTIONS

1. *Source.* The procedures for the loading assumption calculations contained in this Appendix conform to Regulation 25 of Annex I of the International Convention for the Prevention of the Pollution from Ships, 1973, done at London, November 2, 1973.

2. *Loading Assumptions.* For the purpose of calculating subdivision and damage stability for a tank vessel, the operating drafts must reflect actual partial or full load conditions consistent with trim and strength of the vessel. Ballast conditions need not be considered if the tank vessel is not carrying oil in cargo tanks excluding oily residues. Loading condition must reflect the specific gravities of the cargo.

3. *Damage Assumptions.*

(a) Damage is applied to all conceivable locations along the length of the vessel as follows:

(1) For a vessel of more than 225 meters in length, anywhere in the vessel’s length.

(2) For a vessel of more than 150 meters, but not exceeding 225 meters in length, anywhere in the vessel’s length except where the after or forward bulkhead bounding a machinery space located aft is involved in the damage assumption. The machinery space is calculated as a single floodable compartment.

(3) For a vessel 150 meters or less in length, anywhere in the vessel’s length between adjacent transverse bulkheads except the machinery space.

(b) The extent and the character of the assumed side or bottom damage, as defined in section 2 of Appendix A of this part, must be applied except longitudinal bottom damage within 0.3L from the forward perpendicular must be assumed to be the same as that for side damage. If any damage of lesser extent results in a more severe condition, such damage must be assumed.

(c) If damage involves transverse bulkheads as specified in paragraphs (a)(1) and (2) of this section, transverse watertight bulkheads must be spaced at least at a distance equal to the longitudinal extent of the assumed damage specified in paragraph (b) of this section in order to be considered effective. Where transverse bulkheads are spaced at a lesser distance, one or more of these bulkheads within such extent of damage

must be assumed as nonexistent for the purpose of determining flooded compartments.

(d) If the damages between adjacent transverse watertight bulkheads is within the definition contained in paragraph (a)(3) of this section, no main transverse bulkhead or a transverse bulkhead bounding side tanks or double bottom tanks is to be assumed damaged, unless:

(1) the spacing of the adjacent bulkheads is less than the longitudinal extent of assumed damage defined in paragraph (b) of this section; or

(2) there is a step or a recess in a transverse bulkhead of more than 3.05 meters in length, located within the extent of penetrations of assumed damage. The step formed by the after peak bulkhead and after peak tank top is not regarded as a step for these calculations.

(e) If pipes, ducts, or tunnels are situated within the assumed extent of damage, there must be arrangements so that progressive flooding may not thereby extend to compartments other than those assumed to be floodable for each case of damage.

4. *Characteristic and Condition Assumption for Calculations.*

(a) Account must be taken of any empty or partially filled tanks, the specific gravity of cargoes carried, and any outflow of liquids from damaged compartments.

(b) The permeabilities are assumed as follows:

Intended space use	Permeability
Stores	0.60
Accommodation	0.95
Machinery	0.85
Voids	0.95
Consumable liquids	¹ 0 or 0.95
Other liquids	² 10 or 0.95

¹ Whichever results in the more severe requirements.

² The permeability of partially filled compartments must be consistent with actual density and the amount of liquid carried.

(c) The buoyancy of any superstructure directly above the side damage is to be disregarded. The unflooded parts of superstructures beyond the extent of damage may be taken into consideration if they are separated from the damaged space by watertight bulkheads and no progressive flooding of these intact spaces takes place. Class I doors are allowed in watertight bulkheads in the superstructure.

(d) The free surface effect is to be calculated:

(1) at an angle of heel of 5 degrees for each individual compartment; or

(2) by assessing the shift of liquids by moment of transference calculations.

(e) In calculating the effect of free surfaces of consumable liquids, it is to be assumed that, for each type of liquid, at least one transverse pair or a single centerline tank has a free surface and the tank or combination of tanks to be taken into account is to